15¢

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • SEPTEMBER 15, 1945

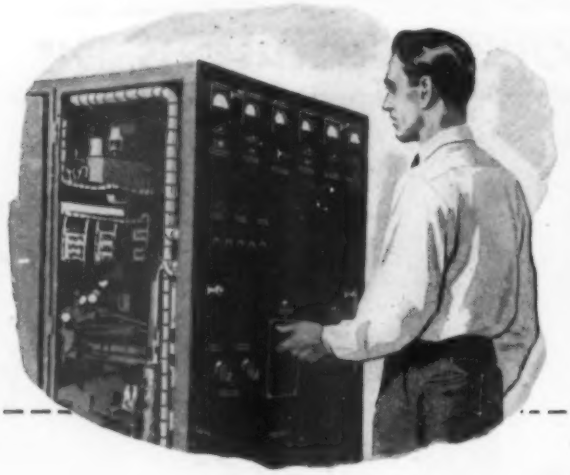
Welding Under Water

See Page 167

A SCIENCE SERVICE PUBLICATION

In a test cell an ENGINEER studies the performance of a jet-propulsion engine that is expected to produce greater thrust—*for its weight* —than any made in America.

. . . the name on the J-P ENGINE is Westinghouse.

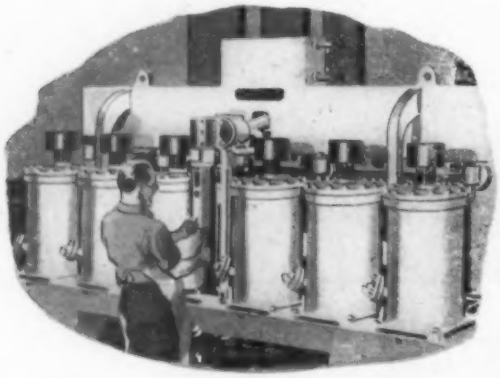


In a synthetic rubber plant a CHEMIST uses a mass spectrometer to analyze a complex gas mixture by sorting its molecules—reducing analyzing time from *days* to a matter of *minutes.*

. . . the name on the MASS SPECTROMETER is Westinghouse.

High in the air a SCIENTIST adjusts a fulchronograph which accurately records the *intensity* and *duration* of thunderbolts—in the never ending study of improved protection against lightning.

. . . the name on the FULCHRONOGRAPH is Westinghouse.



In a refining plant a METALLURGIST uses an Ignitron* rectifier for the more efficient conversion of alternating to direct current — in producing vast quantities of aluminum for our war effort.

. . . the name on the IGNITRON RECTIFIER is Westinghouse.

*Reg. U. S. Pat. Off.

Westinghouse

PLANTS IN 25 CITIES OFFICES EVERYWHERE

TODAY — Westinghouse war products are making vital contributions to final Victory over our enemies in the Far East.

TOMORROW— Peacetime products . . . backed by Westinghouse research, engineering and precision manufacture . . . will contribute to greater efficiency in industry and better living in our homes.

Tune in: JOHN CHARLES THOMAS—Sunday 2:30 pm, EWT, NBC • TED MALONE—Monday through Friday, 11:45 am, EWT, Blue Network

ELECTRONICS

Microwave Radar

Largely a wartime development, it is responsible for equipment that licked Hitler and the Japs. Is of much higher frequency than that of prewar days.

➤ MICROWAVE radar, that is, radar working on much higher frequency than used in prewar days, is responsible for most of the radar equipment that finally brought the Germans and the Japs to their knees. The possibility of the use of high frequency radar was one of the earliest problems tackled by Radiation Laboratory, at the Massachusetts Institute of Technology, after its establishment in November 1940. Most of the radar used by the armed forces had its origin in this laboratory.

Radiation Laboratory is a child of the National Defense Research Committee, whose head, Dr. Vannevar Bush, set up in 1940 a special section to develop enemy detection devices of all sorts and appointed President Karl T. Compton of MIT as the head of the section. Dr. Compton allotted space for the section scientists at the Institute.

At that time, radar was well known to all the major nations and was in active war use. But it was longer-wave radar. Dr. Compton therefore appointed a committee to explore the possibilities of microwave, or very short wave, radar. Later, when developments had matured, a total of approximately 3,800 scientists and others worked on radar at this laboratory.

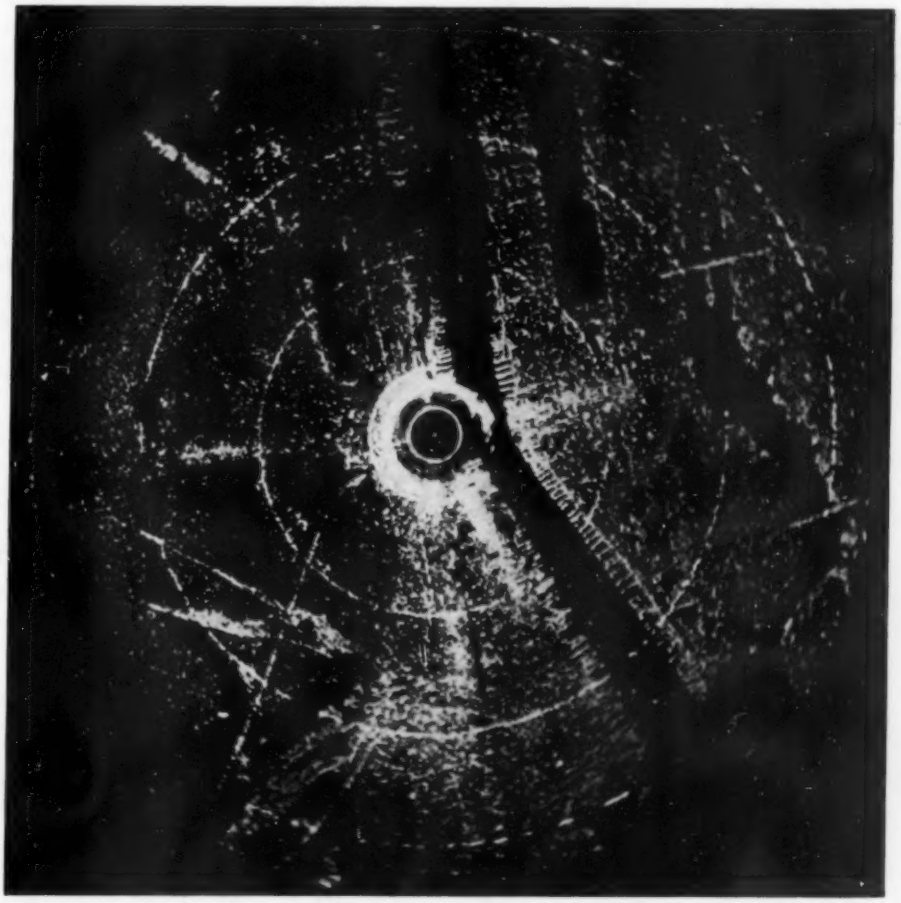
The laboratory staff had begun its exploration of microwave radar before a British mission came to this country in 1940, bringing with it a very high frequency development, called the magnetron, that was capable of generating microwaves of a power theretofore unknown. The mission left the equipment and one of their representatives at the Radiation Laboratory. It was then that the committee decided that the problem was important enough, and promising enough, to require a laboratory of its own and a large staff to work on the problem.

The success of the early warning radar system which can shoulder the burden of spotting dozens of enemy planes within a radius of many miles, and of other radar equipment, is due to the employment of these magnetron and improved microwave appliances.

The waves used are so short that they cannot be carried by ordinary wires and antennae. Instead, they are carried inside a rectangular pipe, or waveguide, from a powerful magnetron to the antenna. Here they are focused by parabolic reflectors, like light waves in a searchlight, and are concentrated into a very sharp beam.

The shape and size of the antenna makes the beam very narrow, giving a very high angular resolution. A large modulator furnishes the transmitter with pulses or bursts of power. These pulses are not measured in seconds, but in terms of millionths of seconds. Any plane within the range of these pulses will reflect them, much diminished, to the antenna and waveguide. There they pass into the receiver, where they are greatly amplified.

The receiver converts the pulses into "video" signals, which can be seen in the indicator on a cathode ray oscilloscope as bright spots of light. Range can be obtained by measuring the time required for the pulse to echo back to the receiver.



***THIS IS NEW YORK!**—This microwave Radar Scope photograph of the city was taken from a B-17 with new high definition apparatus which was designed for use against Japan and would have provided radar identification of important military objectives. The outline of Manhattan Island clearly shows the Hudson river with its shipping docks. The Metropolitan Museum can be seen jutting out into Central Park. On the New Jersey side of the Hackensack river is clearly visible. At the time the photograph was taken the plane was directly over the spot in the center of the circle. Distance is indicated by the concentric circles used for navigation and bombing.*

The Radiation Laboratory succeeded in producing wavelengths even shorter than those produced by the English magnetron. As a result many additional uses of radar were developed. In the summer of 1942, the Laboratory's "sea-search" radar, installed in American and British planes, was patroling the Atlantic ocean. Production sets resulting from it are credited with 50% of the U-boat kills in the Atlantic.

Bombing through overcast by means of radar played a very important part in the destruction of Nazi war essentials. Winter weather over the European continent made necessary the development of some method of putting the bombs on their targets other than by visual means. Radar made blind bombing possible. Both American and British work with radar bombing contributed to the successful radar blind bombing equipment.

In the fall of 1943, about 12 B-17 airplanes equipped with the new radar equipment were sent to England. These planes were to be used as lead aircraft for combat formations, and it was planned that the formation would drop their bombs as directed by them. Trained men from Radiation Laboratory accompanied these radar-equipped planes. Additional blind bombing equipment, much improved, was developed and constructed. It became known as the "Mickey" and proved to be a valuable navigation instrument as well as a blind bombing device.

In principle the "Mickey" set operates like the conventional radar. A pulse of radio energy is sent out from the antenna and at the same time, an electronic sweep starts out from the center of a cathode ray tube. This trace goes out radially, and in the direction in which the antenna points at the moment. Some of the energy pulses are reflected back, amplified, and put on the cathode ray tube. The result is a map of the area beneath the plane.

Ground control approach equipment developed at the Radiation Laboratory will probably have extensive uses in commercial flying to assist planes to runways during overcast and very low ceiling. Early in 1943 the equipment passed exhaustive tests and was accepted by the armed services. It includes two complete radar systems. With one, the operators search the zone surrounding the airport, directing the approaching plane into the sector scanned by the second system. Practically continuous information on the plane's position is thus secured which enables the final controller to guide the pilot down the glidepath by radio. The planes need no special equipment except their ordinary radio equipment.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Expedition Planned

A group of scientists representing the American Museum of Natural History will go to Nyasaland, South Africa, as the first expedition abroad since 1941.

➤ AN EXPEDITION to Nyasaland, South Africa, is planned by the American Museum of Natural History for next April. The museum's first large-scale expedition abroad since 1941 will be led by Arthur S. Vernay, trustee of the museum, who has sponsored numerous expeditions to remote parts of the world for the past 25 years to collect material for exhibition and research.

Southern Nyasaland is one of the few remaining parts of Africa that has not been thoroughly studied by scientists. Mount Mlanje, in the wild and mountainous country south of Lake Nyasa, is a point of especial interest. Specimens of both mammal and plant life will be collected.

Mr. Vernay will be accompanied by Dr. Harold E. Anthony, chairman and curator of the department of mammals; Leonard Brass, botanist; and Capt. Guy Shortridge, director of the Kaffrarian Museum of King William's Town, South Africa.

Although the country abounds in elephant, buffalo, antelope, lion, leopard and other game, the expedition is mainly interested in collecting shrews, mice, squirrels and other varieties of small animals for a complete picture of the mammalian life of this region.

The native plants of Nyasaland are little known, so both dried and pressed plants and living botanical specimens will be collected. This material will go to the New York Botanical Gardens, which is cooperating in the project.

Part of the collections to be made by the Nyasaland expedition will be added to the South African collections of the Kaffrarian Museum, of which Captain Shortridge is director.

The expedition will be in the field for five months, working during the dry season, from May to October of 1946.

Science News Letter, September 15, 1945

Over 5,500,000 *grapefruit trees* were in production in Florida, Texas, Arizona and California in 1942, with approximately 44% of the acreage in Florida.

SCIENCE NEWS LETTER
Vol. 48 SEPTEMBER 15, 1945 No. 11

The weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St. N. W., Washington 6, D. C. NOrth 2255. Edited by WATSON DAVIS.

Subscriptions—$5.00 a year; two years, $8.00; 15 cents a copy. Back numbers more than six months old, if still available, 25 cents. Monthly Overseas Edition: By first class mail to members of the U. S. armed forces, $1.25 a year. To others outside continental U. S. and Canada by first class mail where letter postage is 3 cents, $1.25; where letter postage is 5 cents $1.50; by airmail, $1.00 plus 12 times the half-ounce airmail rates from U. S. to destination.

Entered as second class matter at the postoffice at Washington, D. C., under the Act of March 3, 1879. Established in mimeographed form March 18, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Readers' Guide to Periodical Literature, Abridged Guide, and the Engineering Index.

The New York Museum of Science and Industry has elected SCIENCE NEWS LETTER as its official publication to be received by its members.

Member Audit Bureau of Circulation. Advertising Representatives: Howland and Howland, Inc., 393 7th Ave., N.Y.C., PEnnsylvania 6-5566 and 360 N. Michigan Ave., Chicago, STAte 4439.

SCIENCE SERVICE

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PUBLIC HEALTH

Six Dollars a Month

Will pay the family's sickness bills, including hospital, visits to the doctor's office and specialists, under new plan of the United Medical Service.

➤ ALL the family's bills for sickness, injury and childbirth can be paid for $6 a month under a new, expanded medical care plan launched by United Medical Service, in New York.

The $6 monthly cost breaks down into $2 for hospital care under the Blue Cross plan and $4 for the doctor's bills. This covers visits by the doctor to the patient in the hospital or in his home and visits by the patient to the doctor's office. It also includes payments for the services of qualified specialists when the patient's own doctor refers him to one.

Including payments for home and office visits and specialist's services is a new feature in medical care plans. This provision makes the United Medical Service plan the most comprehensive so far offered by any plan for meeting the costs of sickness.

For the present, no more than 25,000 persons will be able to participate in the expanded service, which is being offered to persons enrolled in groups of 50 or more in Associated Hospital Service of New York. If experience during the trial period justifies it, the service will be extended.

Individuals under the new plan will pay 80 cents a month for the hospitalization feature and $2 for the doctor's bills. The family plan serves mother, father and all unmarried children under 18 years. Subscribers will be entitled to one visit a day from a general practitioner up to as many as 20 visits for any one illness, injury or pregnancy case. Additional visits may be authorized by United Medical Service.

The service provides full coverage for families with annual incomes up to $2,500, and individuals up to $1,800, and partial coverage for other enrolled subscribers. Unlike previous plans, contracts for the expanded service will be issued to employers instead of to individual subscribers. United Medical Service hopes employers will pay the medical service part of the contract if the employee is paying the Blue Cross hospitalization service.

United Medical Service will pay the participating physician $2 for each visit from a subscriber to his office and $3 for each visit he makes to the patient at home or in the hospital. For any call after 8 p.m. the physician may make an additional charge which will not exceed $2 for subscribers in the lower income brackets. For this group of subscribers such payments will constitute the participating physician's entire fee.

Specialists will be paid 50% toward an established base rate fee and will not charge more than the remaining 50% to subscribers with family incomes under $2,500.

More than 8,000 physicians are cooperating in the combined services of United Medical Service, which is sponsored by the Medical Society of the State of New York and 17 county medical societies in the greater New York area.

Science News Letter, September 15, 1945

CHEMISTRY

DDT Was First Given Suspicious Reception

➤ WHEN the first shipment of DDT was received in the United States it was given a somewhat suspicious reception, for fear of possible Nazi scheming to let Americans poison themselves with the then strange chemical. Dr. Fred C. Bishopp, assistant chief of the Bureau of Entomology and Plant Quarantine, stated in an address before an audience of physicians.

Not that the shipment came from Germany: it was known to be authentically Swiss in origin. But it appeared to be a nerve poison, and it was thought that the German authorities might have given permission for the shipment to pass through territory which they controlled, in the hope that we might do ourselves some harm with it.

Subsequent tests demonstrated that in the forms in which it was prepared for insecticidal use, DDT is relatively harmless to human beings and other warm-blooded animals. In its first large-scale tests, in a louse-killing dust blown into the clothing of the inhabitants of North African and Italian cities, it stopped a menacing typhus fever epidemic: no subsequent harm to the people has been reported.

Science News Letter, September 15, 1945

"SUNFLOWER SUE"—A friendly little song sparrow selected the rakish rim of a turned-over sunflower head for her nesting site, (top). The cozy nest, lined with animal hairs, contained four bluish white eggs. Out of them came four hungry young. At times it seemed necessary for the mother bird to take time out from her bug-hunting routine. Photographs by George A. Smith, Quarryville, Pa.

ASTRONOMY

Brighter Than Our Sun

The new star in the constellation of Aquila, the Eagle, is 80,000 times as bright as our sun. It is 8,300 light years away.

➤ THE NOVA or new star recently discovered in the constellation of Aquila, the Eagle, (*See SNL*, Sept. 8), is 80,000 times as bright as our sun. It is 8,300 light years, or about 49,000,000,000,000,000 miles away, as reported telegraphically to the Harvard Observatory from the Dominion Astrophysical Observatory at Victoria, B. C.

These values are based on an examination of the spectrum of the nova by Dr. C. S. Beals, Dr. J. A. Pearce, director of the observatory, stated in his wire. The Victoria spectra show strong emission bands that indicate the presence of hydrogen and of ionized iron as well as other elements.

Two shells of matter ejected from Nova Aquilae '45 are moving with velocities of about 1,300 and 800 miles per second, respectively, measurements of hydrogen lines of the spectrum indicate.

The photographic magnitude of the nova was determined at the Oak Ridge Station of Harvard Observatory by two young women students, Anne Hagopian of Radcliffe College and Constance Sawyer, of Smith College. Both were winners of scholarships in the Science Talent Search, conducted annually by Science Service. (*See SNL*, Mar. 18, 1944, and Mar. 13, 1943). Their data indicate that the brightness of the nova on the first few days of September remained practically constant at magnitude 8.5. A Harvard plate taken on Aug. 27, prior to discovery of the nova, gives the magnitude of the nova as 7.2 on that date, according to Dr. S. Gaposchkin.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Russians Follow Our Lead

Their scientists look to us for leadership in reconstructing the Poulkova and Simeis observatories. American models will be used.

➤ RUSSIAN scientists frankly plan to follow the American lead in postwar reconstruction of their enemy-battered institutions, Dr. Harlow Shapley, director of the Harvard College Observatory and president of Science Service, stated in an address at Boston. Dr. Shapley recently returned from Russia, where he was a member of a delegation of American research men who participated in the 220th anniversary of the founding of the Academy of Sciences of the USSR.

The first thing you notice about a Russian scientist, said Dr. Shapley, "is his complete friendliness. You feel at home with him, and with his problems and plans, from the first moment of your acquaintance. The second characteristic that holds the memory is the quiet ambition of the Russian scientist to do a serious and important job."

That Russians now look to America for leadership in science does not mean, however, Dr. Shapley continued, that they expect to do so permanently, or that they have always done so. It was even the other way about, at one time. America's first really big telescope, a 15-inch refractor installed at Harvard College Observatory just a century ago, was an exact duplicate of the one built for the Poulkova Observatory near what is now Leningrad. This observatory, with its more modern equipment, was completely demolished by German bombs and shells during the siege of Leningrad, because it stood only a mile from the front lines on a hill that had to be used as an observation point by the Red Army.

The second of Russia's two great astronomical observatories, at Simeis in the Crimea, was also destroyed, but without any color of tactical necessity, the speaker added: "Apparently it was largely burned, without any military operations in the immediate vicinity, but not until truckloads of scientific equipment had been carried off to Germany. In other words, the place was looted and then largely destroyed. Russian astronomers have heard that the instruments that had been taken to Germany were evidently too badly damaged to be worth returning to Russia, except possibly 'for exhibition purposes' as one of them put it."

In the reconstruction of both these observatories, American models will be followed in the building of telescopes and other instruments; but the whole process is bound to be slow. You cannot hope to rebuild a great scientific institution as quickly as you can an apartment house or a factory, the speaker commented.

Dr. Shapley's address was broadcast over stations of the Columbia Broadcasting System.

Science News Letter, September 15, 1945

PUBLIC HEALTH

Program Urged to Study Rh Blood Incompatibility

➤ THE dramatic achievements of medical skill in saving the lives of babies threatened with death because the Rh factor in their blood is incompatible with the blood of their mothers may be followed by the tragedy of having a living idiot instead of a dead baby. Calling attention to this, the *British Medical Journal* (Aug. 11), editorially urges an extensive program of cooperative research in this field.

Drs. R. R. Race and A. E. Mourant, of the Galton Laboratory Serum Unit of Cambridge, England, have already offered their services and facilities for such a program, it was announced.

The disease caused by Rh incompatibility, erythroblastosis fetalis, is responsible for more deaths than is any other inherited condition—perhaps for more than all of them put together, the editorial states. But studies recently made in the United States show that a much larger percentage of feebleminded children are Rh positive with Rh negative mothers than would be expected on the basis of statistics for the whole population. This indicates that damage to the baby's brain may occur before birth.

"Rh incompatibility," the editorial declares, "raises a problem in negative eugenics second to no other . . . it seems futile to suggest that the 15% of women who are Rh negative should have 85% of the male population barred to them; yet the dangers are relatively great. It is clear that more research is urgently called for along a number of different lines."

Science News Letter, September 15, 1945

ENGINEERING

Rehearsal for Invasion

Laying the pipeline across the English Channel to deliver gasoline to Allies was preceded by 18 months' experimentation in this country.

➤ THE LAYING of a pipeline across the English channel to deliver gasoline and oil to the American and British armies, soon after the Normandy invasion, was preceded by some 18 months of experimentation both in America and in England, the War Department now reveals. The operation was planned and tested in the winter of 1942-43, long before the actual invasion, and 18 months before the first line under the channel went into actual operation.

Colonel John H. Leavell, of Tulsa, Okla., an oil operator of long and successful experience, began work on the idea of a pipeline from England to France in the summer of 1942. The use of undersea pipelines was not a new idea. They had been used in many places to discharge tankers off-shore when no harbors were available. No 30-mile-long underwater pipe, however, had been tried, or any long pipe under 150 feet of water and the great pressure at that depth.

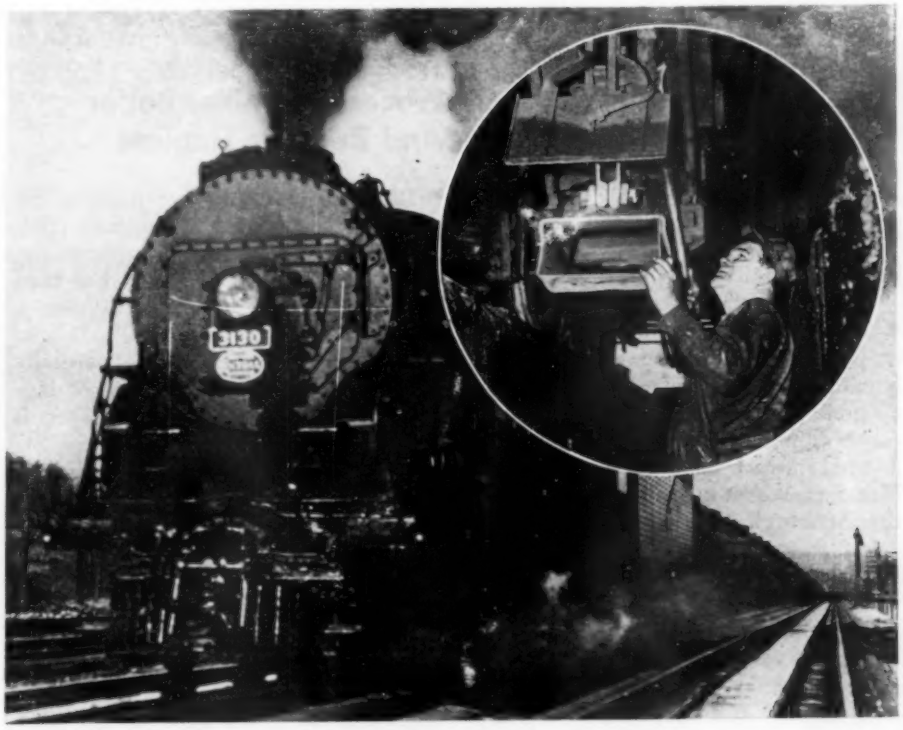
The American experimentation was carried out on a stretch of beach on Martha's Vineyard, an island off the coast of Massachusetts. Ten miles of 4.5-inch extra-heavy pipe were used. One of the basic questions was the effect of friction set up by drawing the long lengths of pipe over the beach and the ocean floor. A 3,000-foot length was dragged 50 miles without undue abrasion and without opening any of the welded joints.

Five one-mile lengths of pipe were assembled adjacent to the shore. One was towed into the ocean and stopped so that the end could be welded to the second one-mile length. This process continued until the five sections were in a single unit, requiring three tow-boats to pull it.

After tests with this five-mile unit were completed, experiments were conducted to determine the practicability of connecting two sections of pipe under water and on the surface. The underwater test was successful in shallow water, but was not suitable for the depths that would be encountered in the English channel. The attempts at surface connections were slow and beset by a number of difficulties.

According to recently published reports, interest in a cross-channel pipeline developed in England also in 1942, the War Department states. This was while plans for invading the continent were being formulated. Experiments under joint English and American auspices developed a flexible pipe similar to the casing of a submarine cable. This was wound on enormous floating drums and unwound as the drums floated across the channel. The first line is reported to have gone into operation on Aug. 12, 1944.

Science News Letter, September 15, 1945



80 MILES AN HOUR!—Water is taken on the fly at jerkwater towns by this New York Central locomotive. When the water scoop was first used, trains had to slow down to 35 miles an hour. It is now possible to take on 5,000 gallons in less than 20 seconds while traveling at 80 miles an hour. As the locomotive reaches the track pan, the scoop is lowered into the trough by a compressed air control. Proper functioning of the scoop, being inspected in the insert, saves precious minutes in meeting train schedules.

ENGINEERING

Underwater Welding Now Photographed

See Front Cover

➤ PRACTICABILITY of welding and cutting underwater has been proven successful by a number of recent applications, such as salvage work on damaged war vessels. However, such work has literally been done in the dark, as no one except the diver or a companion has been able to see the actual operation of this modern technical development of the arc welding process. Now, for the first time, so far as known, underwater welding has been successfully pictured.

Shown in the picture on the front cover of this SCIENCE NEWS LETTER is R. L. E. Cook, representing the Lincoln Electric Company, arc welding under 15 feet of water. The welding is being done with a mild steel electrode having a special coating that is impervious to water.

The photograph was taken through a porthole in the specially designed tank used for training welders in underwater welding and cutting operations in the Mechanical Division of the Panama Canal Zone Authority.

Science News Letter, September 15, 1945

GENETICS

Plants Springing Up In Atom-Blasted Cities

➤ PLANTS, reported growing already on the sites of the Japanese cities blasted by atomic bombs, should be examined by trained geneticists for possible clues to the truth or falsity of the "death-ray" stories diligently propagated by the Japanese press and radio, seemingly as a bid for sympathy.

If the soil in which they are growing really was so impregnated with radioactive substances that it is still giving off secondary radiations dangerous to human and other life, effects should show up in the plants, as a higher-than-average occurrence of mutations or "sports"—sudden evolutionary changes appearing in seedlings from seeds that will be borne by the plants now growing.

Changes of this sort have been induced experimentally in the past, by bombarding the seed-forming organs of plants with X-rays, radium radiations, etc. If such changes do not appear, or are not unusually numerous, additional doubt will be cast on the Japanese "horror-ray" stories.

Science News Letter, September 15, 1945

ASTRONOMY

Evergreens Will Greet Visitors to Mars

➤ ADVENTUROUS travelers to Mars in the 21st century may welcome the sight of familiar evergreen plants which Prof. Gabriel A. Tikhoff of Tikhoff Observatory, Leningrad, believes exist on the planet.

In addition to the polar caps of ordinary ice and the moist green areas which flourish in early summer, there are other regions on the planet where plants grow that retain their color throughout the winter, Prof. Tikhoff states.

Replying to opponents of the theory that plants live on Mars, Prof. Tikhoff said that conifers reflect the infrared rays of the sun less readily than deciduous trees, which lose their foliage every year. Since conifers are believed to protect themselves from winter's cold by this reduced reflection of infrared rays, which carry considerable heat energy, he stated, this feature would probably be even more strongly developed on Mars. This would account for the absence of great brilliance in infrared photographs of the planet.

This winter Prof. Tikhoff plans to investigate further the plant life of Mars, he reported to the Soviet Scientists Anti-Fascist Committee. He will photograph the spectrum of various types of foliage from mountainous altitudes.

Science News Letter, September 15, 1945

CHEMISTRY

Peanuts Keep Best at Moderately Low Humidity

➤ PEANUTS and peanut candy spoil soonest when humidity is high, keep best when it is held at a controlled level of about 60%, Dr. J. G. Woodroof and associates at the Georgia Experiment Station have discovered.

Best thing to do with freshly harvested peanuts, they found, is to dry them rapidly. A current of hot air at 130 degrees Fahrenheit for about eight hours was found adequate for the purpose. After that, the moisture content of the peanuts themselves should be held as close to 5% as possible.

Best moisture percentages for various peanut products were found to be: roasted peanuts, 1.5%; hard peanut candies, 2%; soft peanut candies, 5%; peanut flour, 4%.

Salted peanuts, which are roasted in oil, keep better if the processing is done in fresh oil. Peanuts roasted in re-used oil tend to spoil more readily in moist atmospheres.

Science News Letter, September 15, 1945

CHEMISTRY

Rubber-Film Linings For Shipping Caustics

➤ SHIPMENT of caustic soda and caustic potash in metal drums or tank cars is made safer and more satisfactory by a simple process whereby they are given rubber-film linings, covered by patent 2,384,111, which was obtained by Dwight Means of Wadsworth, Ohio, assignor to the Pittsburgh Plate Glass Company.

It is customary to fill containers with the caustics in molten form, and to heat them again when preparing to empty them. In their heated state the caustics are highly corrosive, which not only increases risks in handling them but introduces iron from the container as an impurity in the chemical. Mr. Means remedies this by coating the inner surface of the container with rubber latex in which sulfur and other vulcanizing materials are already incorporated. When the hot caustic is poured in, the heat suffices to vulcanize the rubber into a firm, impermeable protective surface.

Science News Letter, September 15, 1945

IN SCIENCE

MEDICINE

Old Indian Arrow Poison Tried as Polio Remedy

➤ THE USE of curare, the old Indian arrow poison, in the treatment of infantile paralysis is reported by Dr. Nicholas S. Ransohoff, of Long Branch, N. J., in the *Journal of the American Medical Association,* (Sept. 8).

The arrow poison was tried in four consecutive cases at Monmouth Memorial Hospital. "Striking improvement of the symptoms" was obtained, Dr. Ransohoff states.

Physicians do not ordinarily report on the value of a treatment that has been tried in only four cases, but Dr. Ransohoff states that he is making this "preliminary" report because "there is a great deal of infantile paralysis in the country at the present time and it is hoped that other observers will use this drug."

Science News Letter, September 15, 1945

METALLURGY

Process Promises Better And Brighter Tinplate

➤ BETTER and brighter tinplate, for cans, bottle caps and a thousand other uses, is promised by a new process on which U. S. patent 2,384,086 has been issued, to Charles E. Glock of Baltimore. The tin is deposited on the steel or black-iron sheet as the latter is passed vertically through an electrolytic bath in a continuous strip. After being coated, the sheet is cold-rolled at very high pressure—250,000 to 500,000 pounds are the figures given by the inventor—at speeds up to 2,000 feet a minute. The metal is slightly elongated during the rolling, increase in length being on the order of 5/32 inch for every 25 inches.

Because the plate is at no time brought into contact with oil, its surface is kept in good condition to take printing or lithographing, often used on can labels and bottle caps. During the process a film of water is maintained on the surface, to protect it against oxygen in the air and prevent incipient rusting.

Mr. Glock has assigned his patent rights to the Crown Cork and Seal Company.

Science News Letter, September 15, 1945

E FIELDS

ASTRONOMY

Earth and the Universe Of About the Same Age

➤ THE EARTH'S crust solidified some three thousand million years ago when millions of galaxies, stars and stellar dust particles were closely packed together, estimates Dr. Harlow Shapley, director of the Harvard College Observatory. The age of the earth's crust is not at all insignificant compared with the creation of the universe, he believes.

Measurement of the ages of the oldest rocks on the earth is likewise a measurement of the total duration of the earth itself, Dr. Shapley states, for the earth quickly changed from the normal, hot, ionized, turbulent, gaseous state of stellar matter to the relatively cold, dead, crusted body of a small or medium-sized planet.

Any earth-sized gaseous or liquid body, isolated in sidereal space, would freeze into solid matter (rocks) practically instantaneously in terms of cosmic time, Dr. Shapley points out in the *American Journal of Science*.

Science News Letter, September 15, 1945

ENGINEERING

Compact Unit Makes Pure Water for Soldiers

➤ A STATIONARY unit capable of purifying 72,000 gallons of water a day can be shipped, knocked down, in eight large crates that fit into one-half of a box-car. Widely used to furnish our troops with drinking water, both at home and in the Pacific area, each unit is the equivalent of the average small town municipal water works.

Where it takes six months to a year to purchase and install the water supply plant for a small town, the Army unit of similar capacity can be set up, by unskilled labor, in two days, the War Department states.

The unit was developed under the direction of the Chief of Engineers three years ago to insure the purity of water at new camps. The Army already was using the portable type of purifier and the mobile unit, but the Engineers wanted a larger plant, capable of supplying a whole camp with potable water.

Exactly 72 hours after the rough sketch was drawn, the first unit had been manufactured, assembled and was operating. Within six days a new factory had been set up by Wallace and Tiernan of Newark, N. J., to manufacture the units.

Pupils in manual training classes, instead of enjoying a summer vacation, were hired as workers and their instructors as foremen. A three-shift day was established and the youngsters raced each other to see which shift could produce the most in eight hours. The contract was completed and the hundredth carload left the plant 44 days after the project was launched. Most of the workers went into the Army and many of them operated the plants abroad.

The unit requires five gasoline-driven pumps. Two "low lift" pumps pick up the water from the source, while two "high lift" pumps force it from the filter to the distribution system. A high-capacity pump backwashes the filter to remove the dirt taken from the water.

Alum, soda ash and chlorine are all added as soon as the water is taken from the source. It passes through flocculation baffles which mix it up. Floc formed by the alum traps foreign material in the water and it then passes to the filter which removes the remaining material. The water is again chlorinated to insure sterilization. Part of the clear water is stored for washing the filter which must be cleaned with pure water.

The plant has controllers, regulators and indicators to show the volume of water, amount of chemicals added and other features which make it practically foolproof.

Science News Letter, September 15, 1945

INVENTION

Modified "Iron Lung" For Polio Patients

➤ INFANTILE paralysis victims who require artificial aid in breathing are promised an improvement over the usual type of "iron lung," in an invention by Dennis R. Scanlan of St. Paul, Minn., on which U. S. patent 2,383,821 has been granted. Instead of enclosing the patient's body in a metal chamber, with only his head projecting, the new device encloses the torso only, and consists mainly of rubber or other flexible material, with only a metal breastplate through which the necessary respiratory movements are transmitted. The patient is able to move his limbs with considerable freedom, and to have his bed raised to varying reclining angles, thus escaping the monotony of lying flat on his back all the time.

Science News Letter, September 15, 1945

HERPETOLOGY

Garden Snake Litter Measures Over 32 Feet

➤ FIFTY-TWO offspring of a 36-inch garter snake, if placed end to end, would measure over 385.7 inches in length. Since common garter snakes in Ohio usually have from 14 to 30 young, a litter of 57, only three of which were stillborn—and two escaped before they could be measured—is quite unusual, John Thornton Wood of the Dayton Public Museum states in the scientific journal *Copeia*. While the average total length of the young snakes was 7.4 inches, the shortest was 6.65 inches and the longest 8.0 inches.

Science News Letter, September 15, 1945

ASTRONOMY

Passage of Meteors Recorded Automatically

➤ PASSING meteors or "shooting stars" can now be recorded automatically and their brilliance measured by an apparatus which includes two photo-electric cells in a balanced circuit. This is the first known electrical recording of meteors, according to Dr. C. W. Gartlein, of Cornell University, who designed the apparatus with Joseph C. Logue of the school of electrical engineering. In the past information concerning meteors was obtained from visual observations.

The photo-electric cells are "aimed" at different portions of the sky, and are so synchronized that when one cell intercepts light which is brighter than that being received by the other, a recording pen on the graph is set in motion.

The jagged line made by the pen not only records the presence and duration of a meteor in the field covered by the photo-electric cell, but also gives a reading of the brilliance of the light. This may be measured accurately by comparing it with the amount of light received by the other cell at the same moment.

Meteors recorded during a meteor shower this August were between zero and one magnitude of brilliance, or about as bright as the star Vega, which is overhead at this season.

The apparatus was designed in connection with the work being done at Cornell on the aurora borealis. Dr. Gartlein said it offers the possibility of counting meteors automatically, eliminating the necessity of observers, and also obtaining more accurate measurement of meteor brilliance.

Science News Letter, September 15, 1945

PHYSICS

Precious Waste Products

What is left after the atomic bomb is produced will open up entirely new fields of medicine and in the treatment of disease.

By CALVIN MOORES and MARJORIE VAN DE WATER

➤ SPLITTING the atom is the greatest scientific achievement of our age.

But the greatest immediate contribution of this research to peacetime living is probably in what were the waste by-products of the Army's atomic plants.

The radioactive substances that were merely a troublesome problem of separation and disposal in the process of making an atomic bomb, will open up entirely new fields of medicine and may supersede X-rays for use in industry to look through metals for hidden defects.

The power that is released by the shattering of uranium atoms may also find special uses. Atomic power might be used to run giant power plants—possibly in countries now undeveloped because they do not have common fuels such as coal.

You will not have an atomic furnace in your basement. Nor will you be able to "fill 'er up" with atoms at the corner filling station. Airplanes will not be sent rocketing through space on the backfire of a bomb such as dropped on Hiroshima.

The terrific heat generated by atomic explosion would not only melt, but vaporize the airplane. And if you had an atomic power generator small enough to fit under the hood of your car, when you stepped on the starter you would blow your whole town to atoms. That is because the only small atomic power generator that we know is the atomic bomb.

Power Under Control

Scientists are now producing stupendous amounts of power under control, but this requires huge plants such as the one on the Columbia River at Hanford, Wash.

In this plant, the energy is being considered as a waste by-product and is being thrown away into the Columbia River in the form of heat. This plant, designed for the production of plutonium for use in the atomic bomb, produced the equivalent of 1,500,000 kilowatts in wasted heat for each kilogram of plutonium in the daily output. The ultimate capacity of the hydroelectric plants at the Grand Coulee Dam is expected to be only 2,000,000 kilowatts.

The steps in producing plutonium are roughly these:

1. Raw material in the form of uranium metal is fed in. A small part of this is uranium 235, a larger part is "ordinary" uranium 238.

2. Atoms of uranium 235 are exploded, producing neutrons. Heat and radioactive substances are by-products.

3. Some of the uranium 238 is converted by neutrons into uranium 239.

4. Uranium 239 changes to neptunium 239.

5. Neptunium 239 changes to plutonium 239. Plutonium, in this plant, was the end product and was chemically separated from the unchanged uranium and the radioactive waste products. But since only a small fraction of the original uranium was used up—

6. As a final step the uranium could be recovered and fed in again to repeat the process.

Heat Is By-Product

But in a power plant it is probable that the plutonium would not be removed. Part of the plutonium would explode along with the uranium 235, producing enormous quantities of heat, and the rest would be converted into uranium 235 which makes the process a complete cycle. In this way eventually all the uranium 238 is converted into plutonium and uranium 235 which are burned up and changed to heat.

The atomic power plant of the future can be built using many of the principles of the Hanford plant for making plutonium. But in addition to the apparatus for splitting atoms it must have steam turbines, generators and condensers like those used in a conventional steam generating power plant. Moreover, location on a river, with its cooling water available for the condensers, will still be necessary.

The familiar apparatus is necessary along with power transmission lines, because the heat produced by splitting atoms is of no use to you in your home until it has been converted into electricity and delivered to your light bulb, toaster or washing machine.

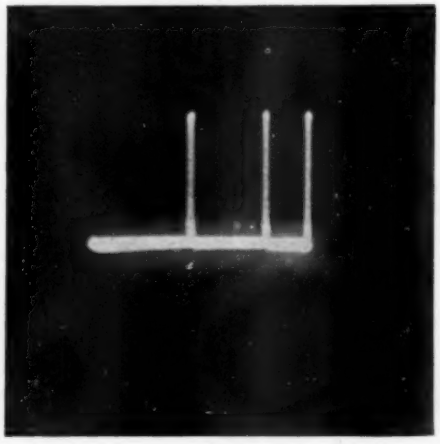
The uranium atoms substitute only for the coal or other fuel, and require a much more complicated furnace to burn them in. But, nevertheless, they might not be more expensive.

Natural uranium may be expected to cost somewhere in the neighborhood of $22 a pound. Coal would not be more than that by the ton at retail. But 140 pounds of natural uranium contain only one pound of U-235. You can get 1,000 times as much electric power from a pound of uranium 235 as you can from a ton of coal.

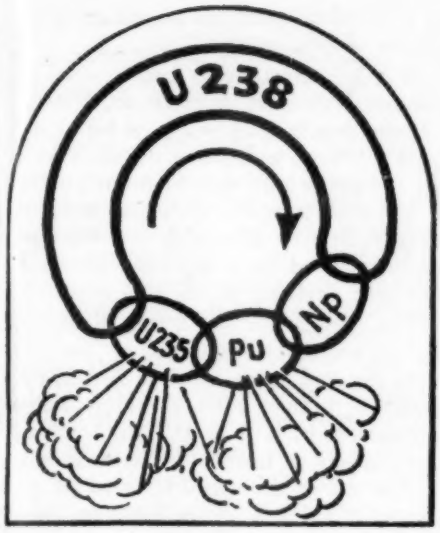
For the present-day consumer this saving would be swallowed up by the great cost of converting the heat to electricity and delivering it to factory and home. In a coal-powered plant, the fuel cost is only one-tenth of the price of the electricity to the consumer. Therefore atoms for fuel could not reduce your bill more than about 10 per cent.

The processes of generating electricity from heat and power transmission are not expected to be changed greatly by the coming of atomic power.

The heart of the atomic power plant, the uranium disintegrator, consists of a sphere built up of graphite blocks. It may be between 20 and 30 feet in diame-



ATOMIC PULSES—In 1939, uranium atoms were first split experimentally, with slow neutrons and much atomic energy released. When the energy is detected and put into an oscillograph, electrical pulses can be seen which closely resemble those shown.



CHAIN REACTION—A small proportion of uranium metal consists of U-235, a larger part is U-238. By splitting the uranium atoms, tremendous power is generated, in an endless chain process.

ter. Graphite is the stuff your "lead" pencil is made of. Into tunnels cut through the graphite sphere are pushed ingots of uranium metal just as it is purified from the ore.

From this point on natural atomic processes, aided by the graphite surroundings, cause some uranium atoms to blow up, releasing power and in turn causing other uranium atoms to blow up in a sort of endless chain.

These atomic explosions cause heat, and this heat can be picked up by circulating a cooling liquid in channels around the uranium ingots. The coolant is then brought out and used to produce steam in a high-pressure boiler. The steam may then be used to operate a conventional turbo-electric generator. Cooling water is then necessary to condense the steam and repeat the cycle.

The astonishing process of apparently spontaneous combustion of the uranium atoms is made understandable by the best present conception of atomic structure and behavior.

Uranium is a hard, heavy, white metal. It is a chemical element and therefore the atom is the smallest unit of it; if you smash the atom you no longer have uranium. All atoms have standard interchangeable parts.

In the heart, or nucleus, of the atom there are protons and neutrons, and it is the number of protons in an atom that determines which element it is. Some uranium atoms have more neutrons than others and are therefore heavier. The two most abundant kinds of uranium have atomic weights of 235 and 238, one type having three more neutrons than the other in the atom. The uranium of weight 238 is 140 times as plentiful as uranium 235.

Ordinarily an atom nucleus is very stable and cannot be broken up except when it is struck with great force by an object smaller than the atom, that is, a part of another atom, for example, a neutron. When the atom bursts, its parts fly out and these may, in turn, strike other atoms.

When the uranium ingots are pushed into the graphite sphere any stray neutron which finds its way to a uranium 235 atom will cause it to blow up and shoot out three new neutrons at high speed. These high-speed neutrons are slowed down by successive collisions with the carbon atoms of the graphite. They collide an average of 200 times and then at low speed find their way back to another uranium 235 atom, producing another explosion.

If the neutron is going neither too fast nor too slow but is slowed down to a medium speed when it strikes a uranium 238 atom, it may not shatter it. It just sticks and makes it uranium 239. This is unstable and turns into neptunium 239, which lasts only a few minutes before it turns into plutonium.

The possible uses of plutonium other than as a super-explosive have not been explored, or at least have not been made public. It is radioactive. It will be difficult to store or transport because except in small amounts it would blow up. It may be that its only usefulness will be in scientific laboratories. It would make possible a small-sized substitute for the giant atom smashers for producing neutrons.

The "waste" by-products of an atomic power plant are the poisonous and intensely radioactive substances, some of which are gases. But it may very well turn out that in the future extremely important uses will be developed for these. Physicians may find that they can be used to treat diseases in new ways or as a substitute for precious radium. They may be used in factories in place of X-rays to detect flaws in large castings.

Nearly all the research leading up to the atomic bomb was focused on the splitting of uranium atoms. There is a possibility, however, that the atoms of other elements may be split with equally spectacular results.

It is not likely that we will be able to explode for power production the atoms of common materials such as water, iron, carbon or even lead. It was not an accident that uranium was first used—the atom of uranium is the heaviest of the elements occurring in nature and therefore could produce lots of energy. Moreover, the uranium atom is comparatively easy to split.

While physicists and the public, especially the Japanese public, are very much impressed with the terrific power of the new atomic weapons, other scientists who deal with such natural phenomena as earthquakes, volcanoes and hurricanes are not so greatly awed because compared to these natural catastrophes an atomic blast does relatively little damage.

That is because these natural phenomena get their energy indirectly from the biggest atomic furnace in our section of the universe—the sun.

Science News Letter, September 15, 1945

Do You Know?

Oxygen is the only element taken by higher organisms in the free state.

Phosphate fed to cattle results in more calves and greater butchering weight.

The *wood bison* is larger, darker in color, and shaggier than the bison found on the Plains.

Seacows are not whales but a distinct group of mammals that have taken to the sea; they are related to the elephants.

Potatoes, one of America's principal food crops, are grown in every state and territory; the 1944 crop was nearly 380,000,000 bushels, of which Maine produced 53,000,000 bushels and Idaho 36,000,000 bushels.

Silica gel, an inexpensive chemical now used inside packages of instruments or machinery to absorb moisture in the air, may soon be used in air-conditioning units to lower the humidity in offices and homes.

Tannin from American sumac will produce light-colored leathers similar to those obtained with imported sumac if the leaves are dried rapidly either by spreading them out in the sun or by artificial heat.

Pears are one of the most satisfactory products from which yeast is made; one pound of starter in the proper media will increase to 64 pounds in 24 hours and requires only a 2% solution of sugar to propagate the yeast.

ZOOLOGY

NATURE RAMBLINGS
by Frank Thone

Super-Rough-on-Rats

➤ A NEW chemical rat-killer, released from under wartime wraps, appears to be just about as deadly to rodent pests as DDT is to flies and mosquitoes. It was developed by chemists and biologists of the U. S. Fish and Wildlife Service at the Patuxent Research Refuge near Washington, D. C., and at the Wildlife Research Laboratory near Denver. First report on the new rodenticide is given by E. R. Kalmbach of the Denver laboratory, in *Science* (Aug. 31).

Chemically, the poison is sodium fluoroacetate. For convenience, it is known by a number, 1080—it was the thousand-and-eightieth in a long series of toxic materials tried out, under a transfer of funds from the Office of Scientific Research and Development.

The new ratbane seems to be the deadliest stuff ever tried out for the purpose. In carefully controlled tests, it has been able to kill the common Norway rat in concentrations as low as five milligrams per kilogram of body weight, Mr. Kalmbach states. That means that if a rat weighing half a pound swallows a pinpoint speck of it weighing less than two ten-thousandths of an ounce, he will die. To certain other rodents, such as prairie dogs, 1080 is deadly in even smaller doses.

One advantage of 1080 is its easy solubility in water. This make it possible to dilute it down to manageable doses, and probably also to add disguising scents or tastes in case rats become too wary. However, the latter precaution should not be necessary: if a rat-infested area is properly baited with 1080 there will be no survivors to teach a younger generation caution. The high solubility of 1080 also makes it possible to offer it to rats in simple water baits; a third of an ounce in a gallon of water has proven quite effective in field tests.

If it has any taste to rats, it must be because they have a more acute sense of taste than human beings. A bit of the pure chemical, well below the toxic level for human beings, was tried out by Dr. Ray Treichler of the Fish and Wildlife Service, now on duty with the War Department, and he stated that he could not taste anything at all.

The deadliness of 1080, however, should not be played down, all workers with the stuff agree. One rat died in exactly 20 minutes after drinking water containing it, and at the end of two hours about a score of dead rats were picked up in the vicinity. It is no respecter of animals, and will kill pet dogs and cats, and possibly game and livestock, if they inadvertently get hold of it. For this reason, it is unlikely to be put on the market for general household use, but is more likely to be put in the hands of professional rodent-killers who wage campaigns against rats among wharves, granaries and warehouses, and against too-numerous prairie dogs and ground squirrels on western rangelands.

The high dilution in which 1080 can be used is one thing that will make it less dangerous, Dr. Treichler pointed out. It would be necessary for a man to eat six ounces of an ordinary bait containing it to get a lethal dose. If a little is swallowed it is soon excreted; its effects are not cumulative like those of many other poisons. Moreover, it is not absorbed through the skin like one of the rodenticides now in general professional use; this is a very great practical advantage in field handling.

Science News Letter, September 15, 1945

The *Peruvian Andes* differ strikingly from the American Rockies in the absence of a timbered zone.

GENERAL SCIENCE

Cooperation Growing Among Scientists

➤ INTERNATIONAL cooperation among scientists of the Americas has grown rapidly during the war, and is expected to continue its increase now that peace has come, Dr. Raymund L. Zwemer, executive director of the Interdepartmental Committee on Cultural and Scientific Cooperation, Department of State, told his audience in a radio address. Subjects covered range through the whole alphabet of science from anthropology to volcanology.

As a concrete example, Dr. Zwemer cited the joint program of research carried on by Mexican and American scientists on the new volcano Paricutin. This has involved not only volcanology but many other sciences, from the related ones of seismology and geology to some that at first would hardly be thought of in connection with volcanoes, such as botany and soil conservation.

As another example, the speaker mentioned a three-cornered cooperative project fostered by the Weather Bureau, involving Cuba, Mexico and the United States. Much of the weather we get in this country is bred in the Caribbean and Gulf areas, and without the assistance of Cuban and Mexican meteorologists we would not be building up the better knowledge of weather conditions in these southern waters that is vitally needed in all three countries.

Dr. Zwemer spoke as the guest of Science Service on the "Adventures in Science" program broadcast by the Columbia Broadcasting System.

Science News Letter, September 15, 1945

WILDLIFE

Oyster Crop Short Again Because of Manpower Lack

➤ OYSTERS will be far from plentiful again this year, the U. S. Fish and Wildlife Service has announced after a survey of the principal oyster areas of the Atlantic and Gulf coasts. The only bright spot in the otherwise dim prospects is the Long Island region, where carefully tended oyster beds are bringing to maturity the crop that was set in 1940 and 1941.

Lack of manpower to take care of the shellfish while they are growing and to bring them in when they reach marketable size is an outstanding factor in the shortage. In one important oyster area, in the neighborhood of Hampton Roads, Va., increased water pollution due to wartime industrial activity has been an additional factor in decreasing oyster yield.

Science News Letter, September 15, 1945

INVENTION

Combined Scouring And Polishing Powder

➤ A COMBINED scouring and polishing powder, covered by patent 2,384,006, is the invention of Joseph M. Bleakney of Manhasset, N. Y. It incorporates sawdust, to make it lighter and less scratchy in its action; other ingredients are diatomaceous earth, soap powder and a binder.

Science News Letter, September 15, 1945

The *guinea pig*, standard laboratory helper, came originally from Peru.

Sugar helps preserve the color and flavor of canned fruit, but if sugar is not available, the fruit may be canned unsweetened and sweetened when used.

• Books of the Week •

THE CHARACTERIZATION OF ORGANIC COMPOUNDS—Samuel M. McElvain—*Macmillan,* 282 p., illus., $3.40.

THE FALLING SICKNESS: A History of Epilepsy from the Greeks to the Beginnings of Modern Neurology—Oswei Temkin—*Johns Hopkins Press,* 380 p., illus, $4.

500 POSTWAR JOBS FOR MEN—Vocational Guidance Research—*Doubleday,* 285 p., $2.50. A dictionary of 500 different kinds of jobs, listed alphabetically.

A GENERAL ACCOUNT OF THE DEVELOPMENT OF METHODS OF USING ATOMIC ENERGY FOR MILITARY PURPOSES UNDER THE AUSPICES OF THE U. S. GOV'T., 1940-1945—*H. D. Smyth,* 169 p., paper., $1.25. Cloth, $2. Written at the request of Major General L. R. Groves, U. S. Army. Reproduction in whole or in part is authorized and permitted.

MAN'S MOST DANGEROUS MYTH: The Fallacy of Race—M. F. Ashley Montagu—*Columbia Univ. Press,* 304 p., $3.25. 2nd ed., revised and enlarged, with a foreword by Aldous Huxley.

PROCEDURE HANDBOOK OF ARC WELDING DESIGN AND PRACTICE—*Lincoln Electric Co.,* 1282 p., illus., $1.50. 8th ed., revised and enlarged.

PROGRAM PATTERNS FOR YOUNG RADIO LISTENERS IN THE FIELD OF CHILDREN'S RADIO ENTERTAINMENT—Dorothy Lewis and Dorothy L. McFadden—*Nat. Assoc. of Broadcasters,* 80 p., paper, free. For use by radio stations and writers of children's programs.

RADAR: A Report on Science at War—*Supt. of Doc.,* 53 p., paper, 15 cents. Released by the Joint Board on Scientific Information Policy for the Office of Scientific Research and Development, War Dept., and Navy Dept. Distributed through the facilities of the Office of War Information.

RADAR: An Official History of the New Science with Technical Descriptions and Glossary of Radar Terms—*British Information Services,* 30 p., paper, free.

Science News Letter, September 15, 1945

GENERAL SCIENCE

Laboratories for India

➤ NINE specialized laboratories for industrial and scientific research are recommended for India, to be erected during the next five years, by an Indian Industrial Research Planning Committee, it is revealed by the information service of the Government of India. A technological institute on the lines of the Massachusetts Institute of Technology is included in the recommended program for scientific development, and also a $6,000,000 grant to the scientific departments of India's 18 universities to be used in training 700 research workers in the next five years.

The Industrial Research Planning Committee was appointed in 1944 by the Government of India's Council of Scientific and Industrial Research to make a comprehensive survey of existing facilities for scientific and industrial research and to report on necessary measures of development, coordination and control of various research agencies in India.

Members of the committee visited the United States in 1944, inspected American research undertakings and consulted with American scientists.

The Indian committee recommends for control a National Research Council, consisting of representatives of scientific bodies, universities, industry, labor and administration. The council, in addition to its duties in maintaining national research activities and stimulating research by private organizations, would also serve as a national trust for patents and set up a board of standards and specifications.

Science News Letter, September 15, 1945

STATISTICS

College Men Marry Well-Educated Girls

➤ ALTHOUGH most men marry girls with less education than they have, the more educated a man is, the more likely he is to choose a wife who also has more than average education, Paul H. Landis and Katherine H. Day, State College of Washington, report in the *American Sociological Review.*

Most of the college students they studied, both men and women, married within the same general educational level as their own. Of 330 students in the entering class of 1936 at the State College of Washington, 71.5% picked a bride or groom with training beyond high school. Only 1.5% married persons with only elementary education, while 27% married persons with high school training.

Science News Letter, September 15, 1945

Deep water in four of the five *Great Lakes* is below sealevel.

THE BIRD WITH THE 16-MILE TAIL

The wire you see with the parachute on the end of it is a telephone wire, being payed out from a C-47 plane.

Bell Telephone Laboratories, working with the Air Technical Service Command of the Army Air Forces, developed this idea. It will save precious lives and time on the battlefield.

A soldier throws out a parachute with the wire and a weight attached. The weight drops the line to the target area. From then on, through a tube thrust out the doorway of the plane, the wire thrums out steadily — sixteen miles of it can be laid in 6 2/3 minutes. Isolated patrols can be linked quickly with headquarters. Jungles and mountains no longer need be obstacles to communication.

This is in sharp contrast to the old, dangerous way. The laying of wire through swamps and over mountains often meant the transporting of coils on the backs of men crawling through jungle vegetation, and in the line of sniper fire. It is reported that in one sector of the Asiatic theater alone, 41 men were killed or wounded in a single wire-laying mission.

Bell Telephone Laboratories is handling more than 1200 development projects for the Army and the Navy. When the war is over, the Laboratories goes back to its regular job — helping the Bell System bring you the finest telephone service in the world.

BELL TELEPHONE LABORATORIES

Exploring and inventing, devising and perfecting for the Armed Forces at war and for continued improvements and economies in telephone service.

•New Machines and Gadgets•

❁ *BACK WASHER, for use in a bathtub, is an endless scrubbing-towel passing over a lower immersed roller and an upper motor-driven roller. A framework straddles the tub to hold the device in position. An electric motor rotates the upper roller, dragging the wet towel upward against the bather's back.*

Science News Letter, September 15, 1945

❁ *TWEEZERS for plucking eyebrows or pulling out splinters have a small flashlight for a handle. The gripping jaws are fashioned from a resilient plastic of the type capable of piping light to the points of the jaws, giving illumination where most needed.*

Science News Letter, September 15, 1945

❁ *PACKING BOXES, developed by the Army particularly for Pacific area shipments, are made of single-ply panels, consisting of 1/16 inch hardwood, faced on both sides with Kraft board. The facing, bonded to the wood with a water-resistant glue, is uninjured by water.*

Science News Letter, September 15, 1945

❁ *FROZEN food container, about the same size and shape as the familiar chocolate can, is made of paraffin-impregnated fiber board with ends of light tinplate. After one corner of an end is pried up with a knife or hook opener, it can easily be peeled off.*

Science News Letter, September 15, 1945

❁ *REPEATING flask tube shoots, with machine-gun-like rapidity, brilliant "bolts of lightning" from warplanes fitted with special electronic equipment. The tube, shown in picture beside a photo-flash bulb, permits taking countless night aerial photographs of any territory from altitudes up to two miles.*

Science News Letter, September 15, 1945

❁ *CATHODIC protection rectifiers reduce the corrosion of underground metal structures, caused by electric currents set up by chemical action between the metals and substances in the soil, by setting up a counter-current. The apparatus has no moving parts, and therefore needs little attention.*

Science News Letter, September 15, 1945

❁ *MILLINERY for 1946 may be made of a new synthetic straw fabric knitted with lustrous rayon yarns alternating with dull ones to give it a crystal-like sparkle. The fabric is treated with a water-repellent which also makes fingermarks and dust easily removable.*

Science News Letter, September 15, 1945

❁ *PERISCOPE gun sight, used in some fighter planes, has two viewing ends, one above the plane, the other below. A flip-over mirror transfers the gunner's line of sight from one to the other. When the periscope tube is rotated to scan the sky, the gun turrets move with it.*

Science News Letter, September 15, 1945

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 276.

Question Box

ASTRONOMY

How is the passage of meteors recorded automatically? p. 169.

What new star is 80,000 times as bright as our sun? p. 166.

CHEMISTRY

Why was DDT given a suspicious reception? p.165.

Under what conditions do peanuts keep best? p. 168.

ELECTRONICS

What is microwave radar? p. 163.

ENGINEERING

How long did it take to prepare the pipeline across the English Channel prior to the invasion? p. 167.

GENERAL SCIENCE

Where will the first expediton abroad since 1941 be? p. 164.

GENETICS

How can plants show the presence of radioactivity in the soil? p. 168.

INVENTION

What is the improvement in the new "iron lung" for polio patients? p. 169.

PHYSICS

For what can the waste products from making the atomic bomb be used? p. 170.

PUBLIC HEALTH

What is the six-dollar a month plan? p. 165.

Where published sources are used they are cited.